Table 4. One-year and three-year coupon weight changes and measurement uncertainties.

Material Type	1-Year 4-ft Depth Average Weight Change (mg)	3-Year 4-ft Depth Average Weight Change (mg)	1-Year 10-ft Depth Average Weight Change (mg)	3-Year 10-ft Depth Average Weight Change (mg)	2σ Balance Uncertainty (mg)	2σ Cleaning plus Balance Uncertainty (mg)
Aluminum 6061	-0.98	-12.32	-0.55	-5.07	±0.4	
Beryllium S200F	-47.0	-32.07	-109.8	-507.25	±0.4	
Carbon Steel 1018	-312.2	-891.1	-642.8	-3306.15	±0.8	
Ferralium 255	-0.53	-2.22	-1.0	-1.77	±0.8	
Inconel 718	+0.10	-2.55	-0.05	-3.57	±0.8	
304L	-0.08	-1.82	-0.45	-2.52	±0.8	±0.92
316L	-0.53	-2.67	-0.43	-3.57	±0.8	±0.89
316L Welded	+0.48	-1.45	+0.58	-2.22	±0.8	±0.98
Zircaloy-4	+0.98	-0.27	+1.15	-0.97	±0.8	

Apparent from Table 4 is that the averages from the measured weight losses for the beryllium and carbon steel is much greater than for any other coupon compositions. The only composition not exceeding the 2σ balance uncertainty is Zircaloy-4. The lack of combined cleaning/balance uncertainties for most of the metal alloys continues to leave a gap in the data, particularly for the beryllium. The contribution of the cleaning process to the uncertainty for the beryllium still remains unknown, and its inclusion in the analysis would add credibility to the beryllium corrosion rates.

3.3 Preliminary Evaluation of Trends

Figures 19 through 36 plot the individual coupon weight losses from the 1- and 3-year coupons for each composition, with balance uncertainties and combined cleaning and balance uncertainties noted as error bands, as applicable. These data plots illustrate the fact that for most compositions, the 1-year weight losses are "buried in the noise" while the three-year weight losses have significance.

The conclusion to be drawn from these results is that the actual corrosion rates for stainless steels at the SDA might be considerably lower than the standard corrosion rates developed by Oztunali and Roles (1986) as applied to the SDA performance assessment. However, these are early results, and only the stainless steels and carbon steel can be compared to the standard corrosion rates. Recovery and evaluation of coupons with longer exposure times, as called for in the LTCD test plan, will provide long term data for use in the fate and transport models and for a more accurate evaluation of the corrosion rates of other metals of concern. The test conditions that have existed thus far have involved metals separated from each other in relatively dry soil. Conditions relevant to comparatively study activated metals buried at the SDA, with the associated variable conditions of higher moisture, higher temperature conditions, dissimilar metals in contact with each other and other possible corrosion influences, should be actively pursued.

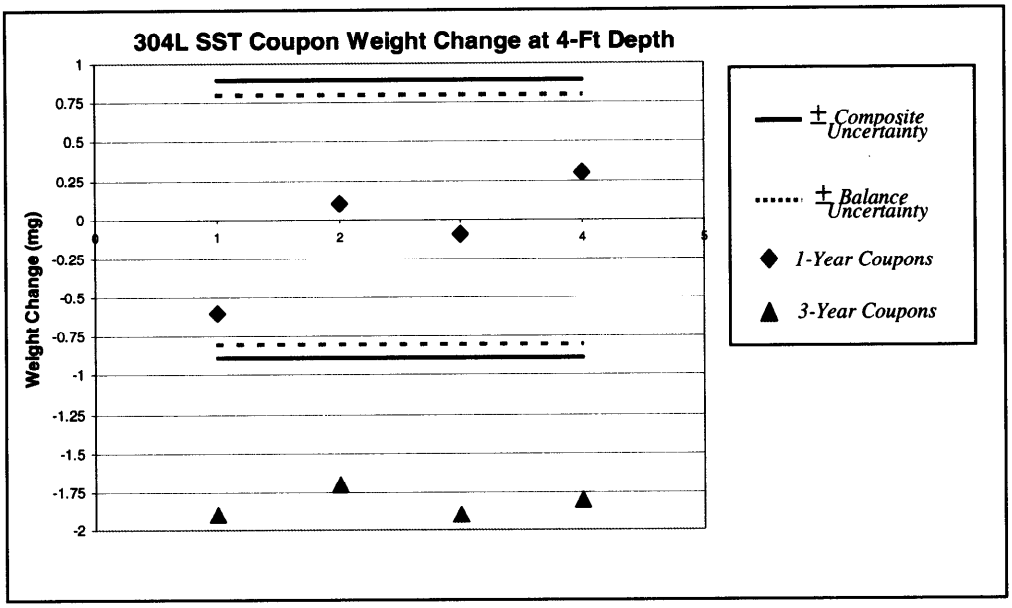

Figure 19. Type 304L stainless steel weight change, 4-ft depth.

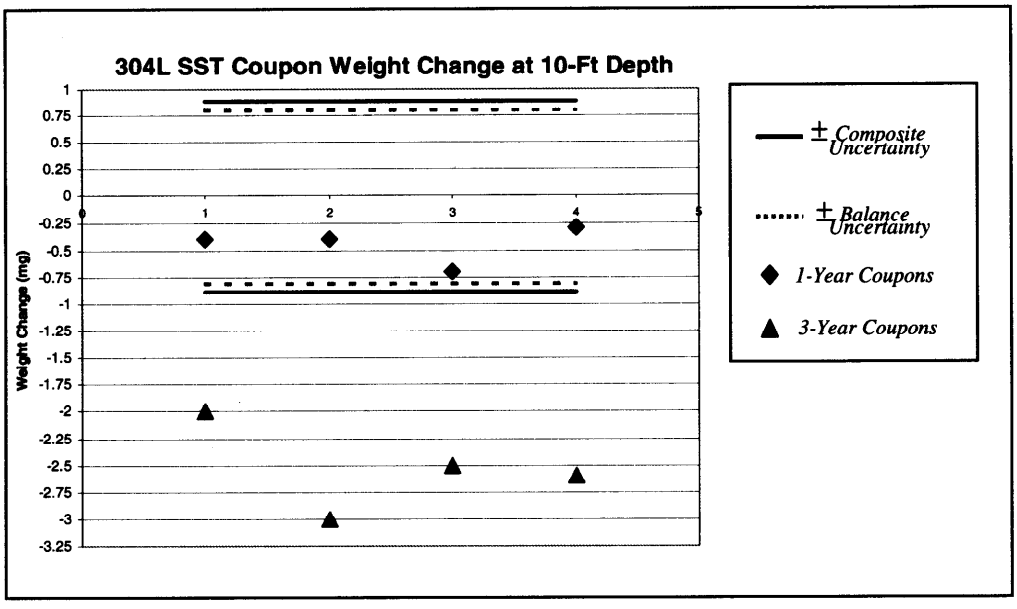

Figure 20. Type 304L stainless steel weight change, 10-ft depth.

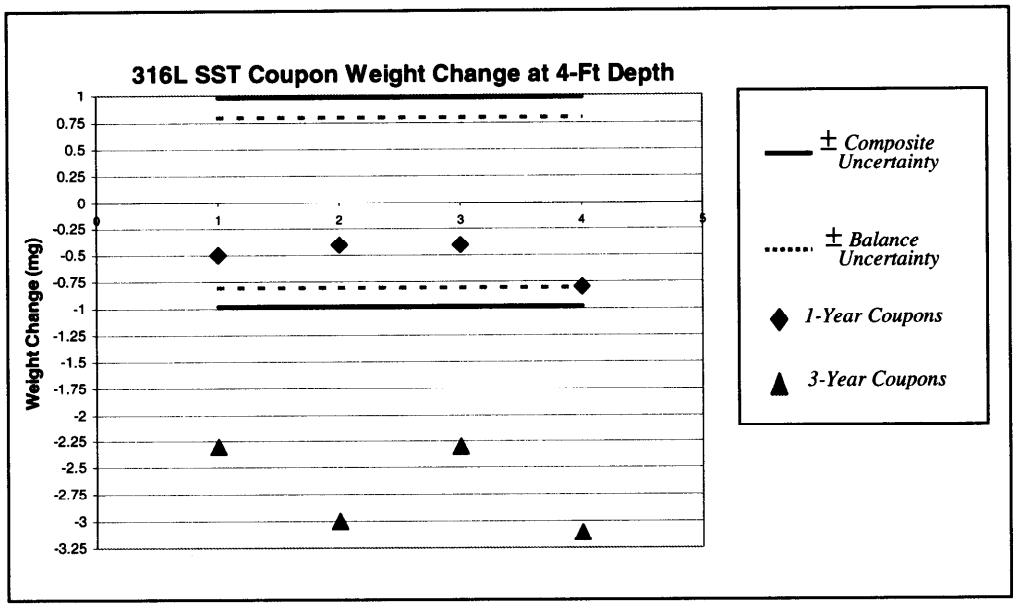

Figure 21. Type 316L stainless steel weight change, 4-ft depth.

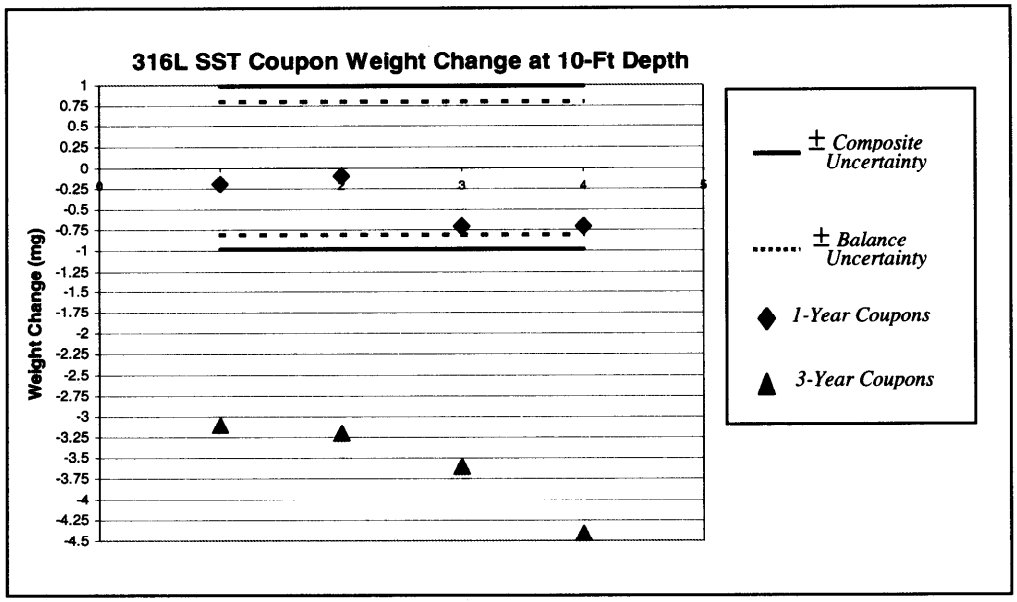

Figure 22. Type 316L stainless steel weight change, 10-ft depth.

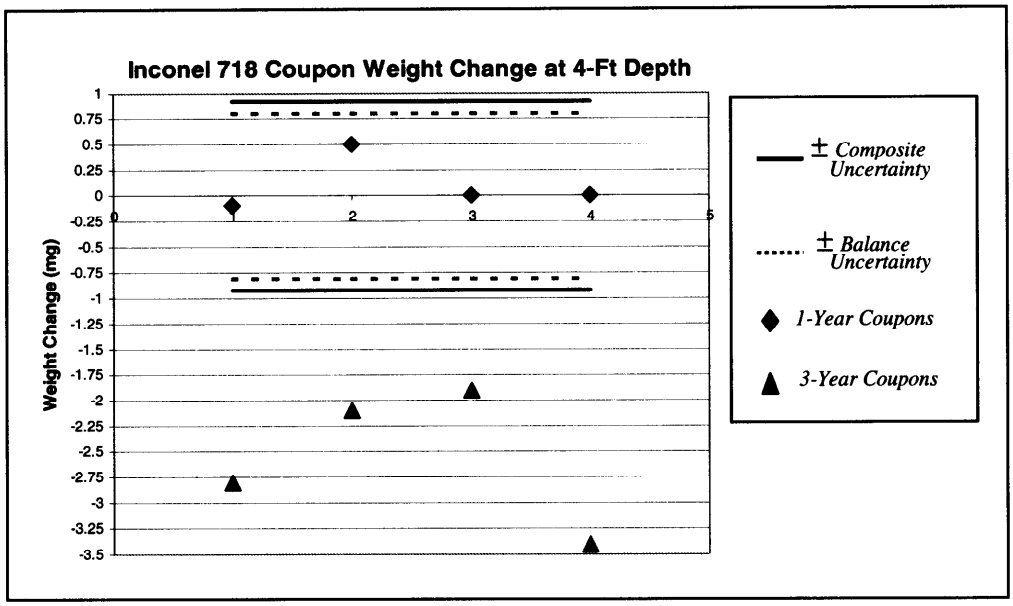

Figure 23. Inconel 718 weight change, 4-ft depth.

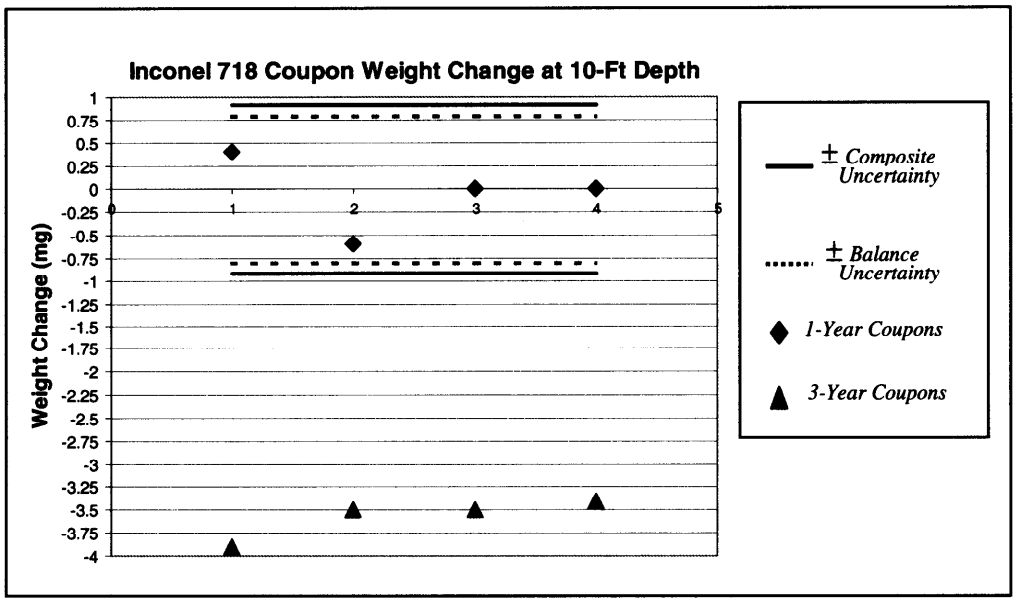

Figure 24. Inconel 718 weight change, 10-ft depth.

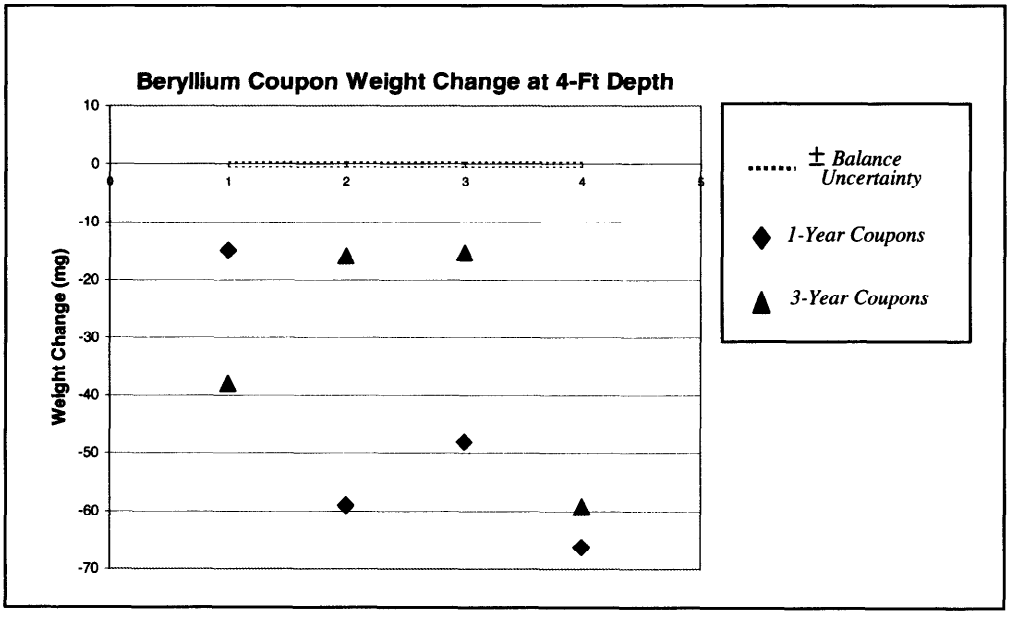

Figure 25. Beryllium weight change, 4-ft depth.

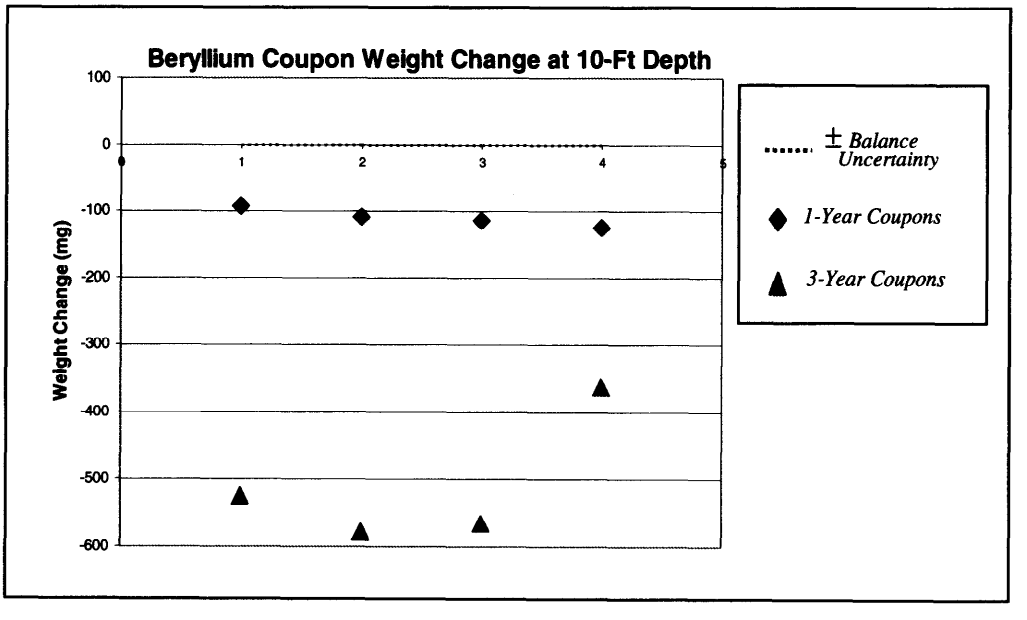

Figure 26. Beryllium weight change, 10-ft depth.

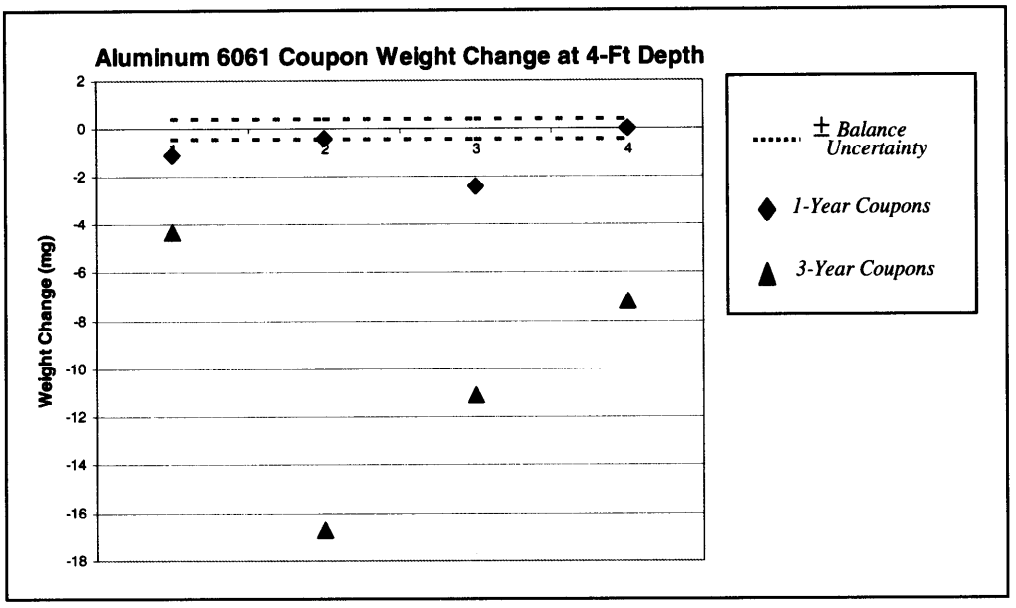

Figure 27. Aluminum weight change, 4-ft depth.

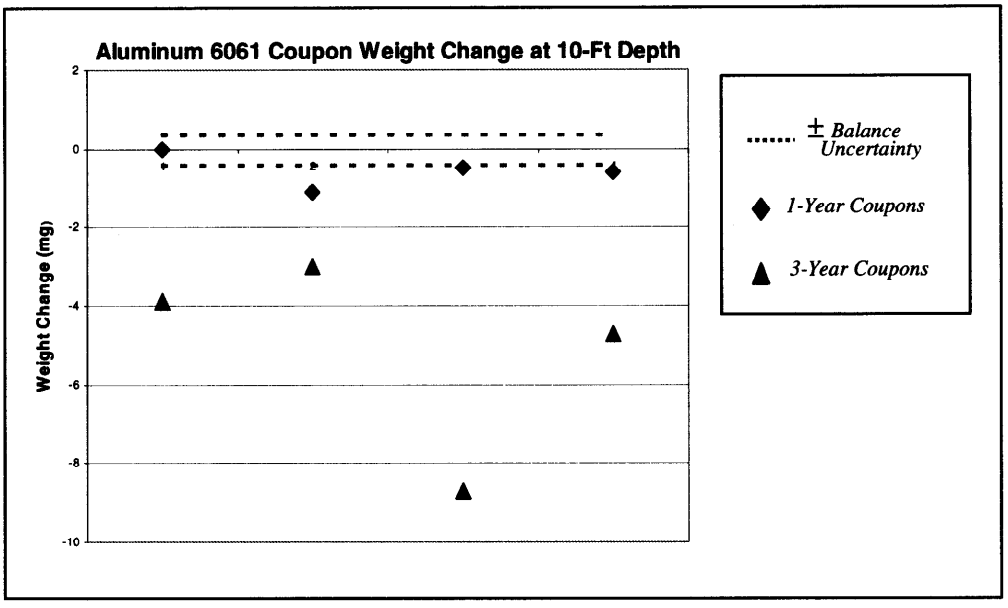

Figure 28. Aluminum weight change, 10-ft depth.

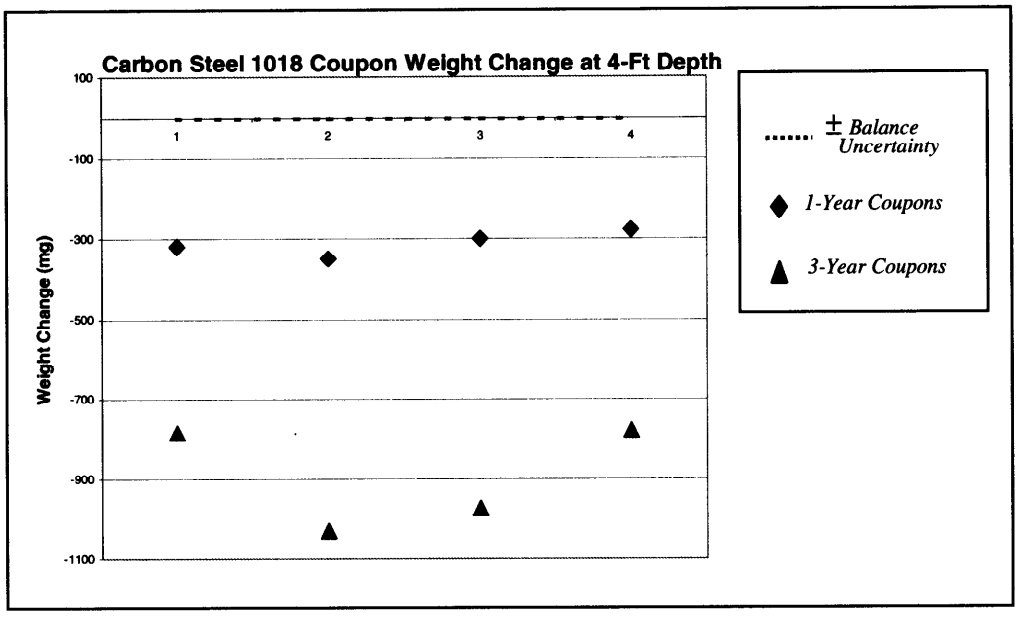

Figure 29. Carbon steel weight change, 4-ft depth.

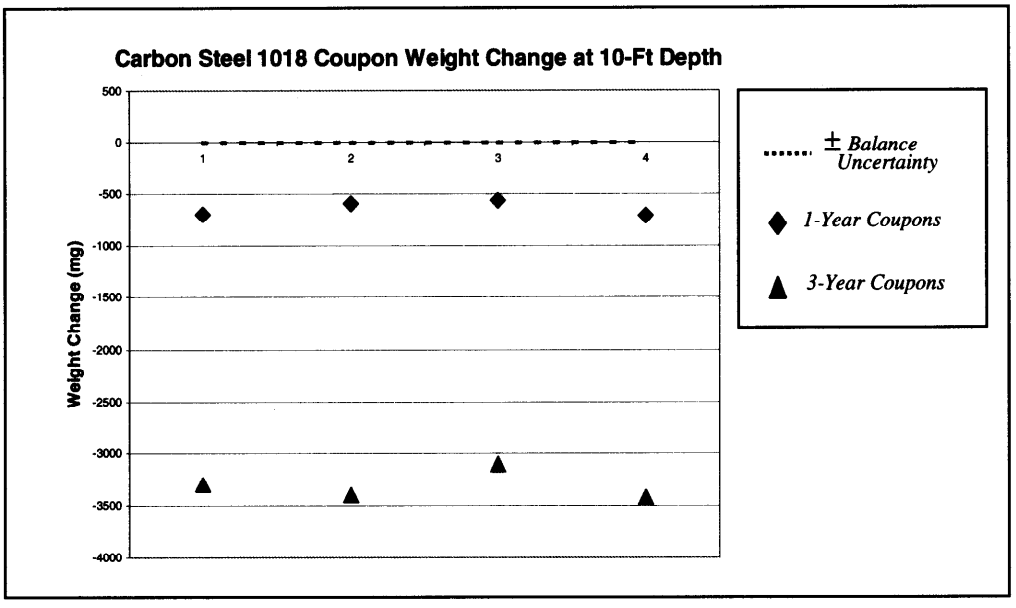

Figure 30. Carbon steel weight change, 10-ft depth.

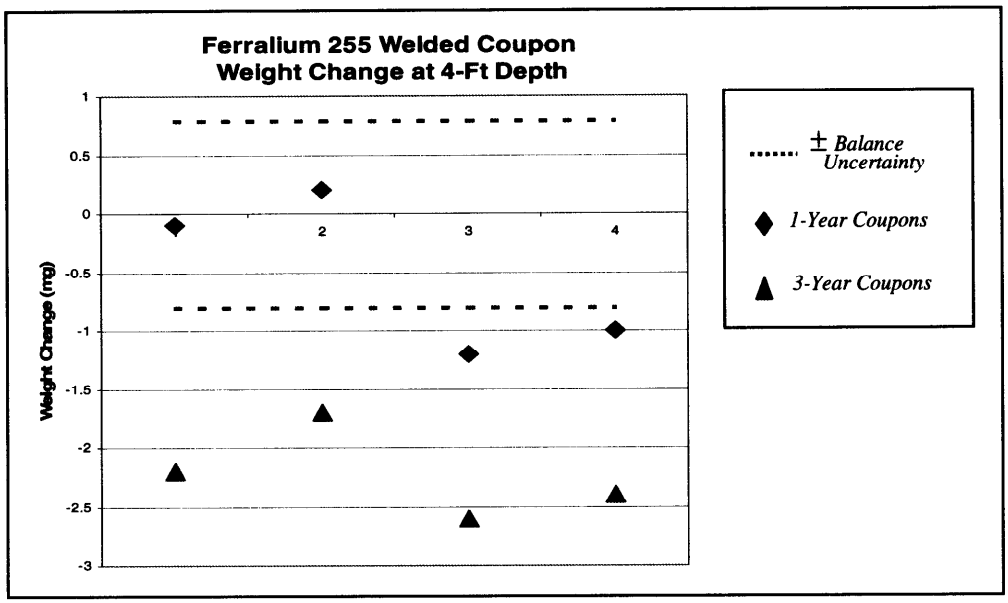

Figure 31. Ferralium 255 weight change, 4-ft depth.

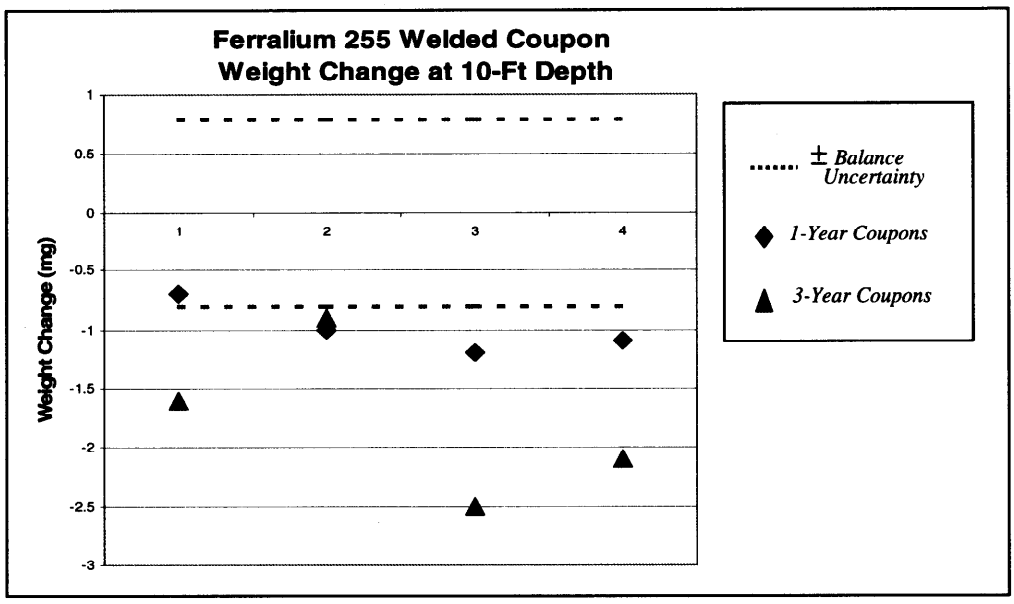

Figure 32. Ferralium 255 weight change, 10-ft depth.

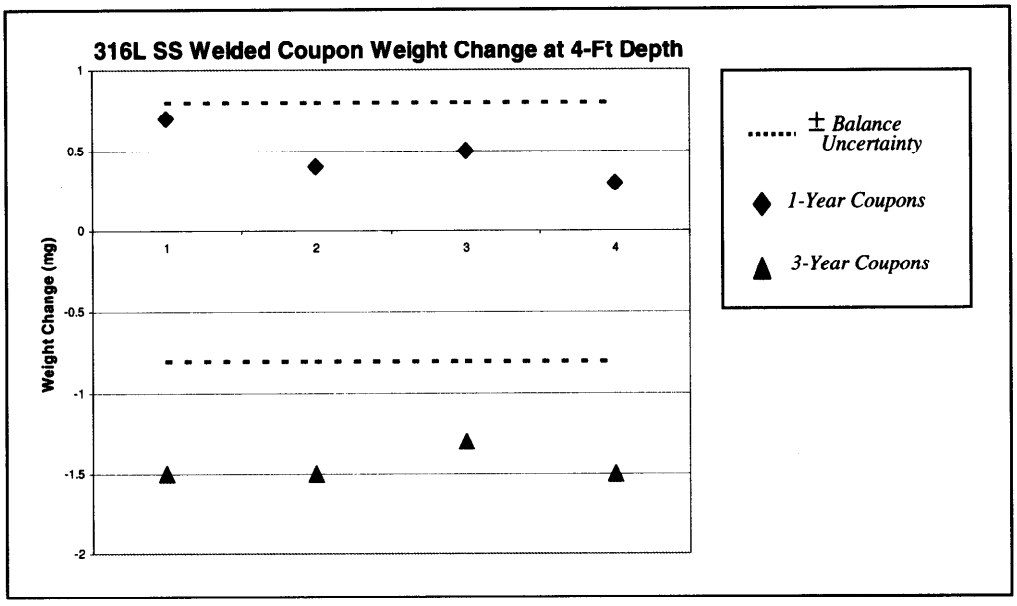

Figure 33. Type 316L welded stainless steel weight change, 4-ft depth.

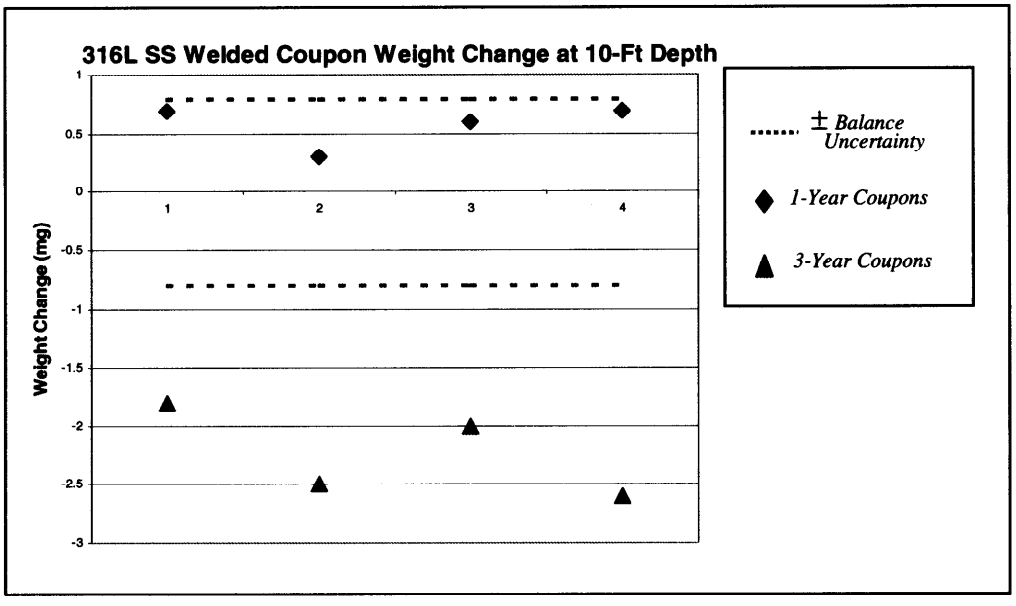

Figure 34. Type 316L welded stainless steel weight change, 10-ft depth.

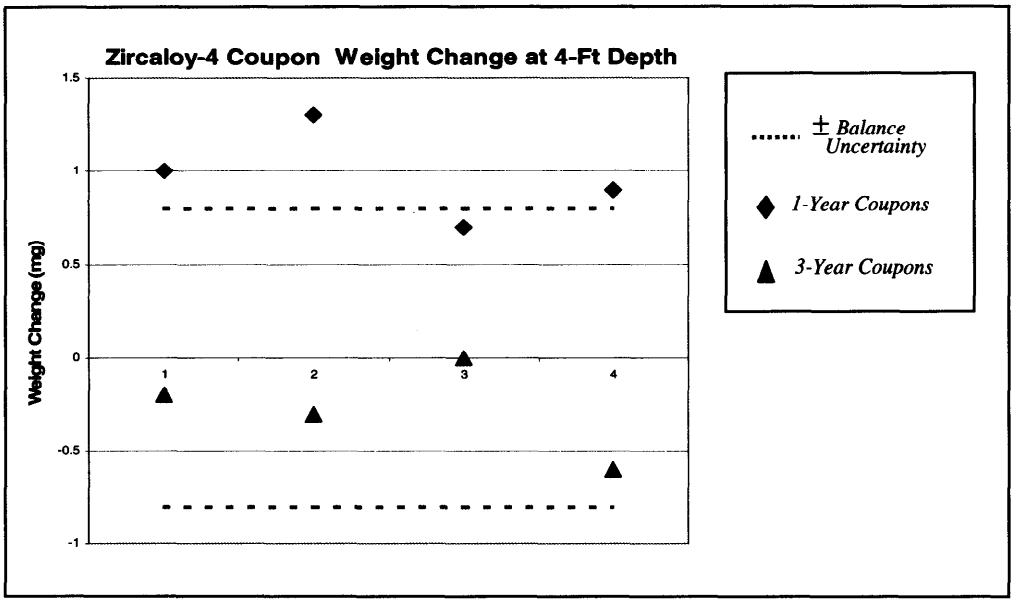

Figure 35. Zircaloy-4 weight change, 4-ft depth.

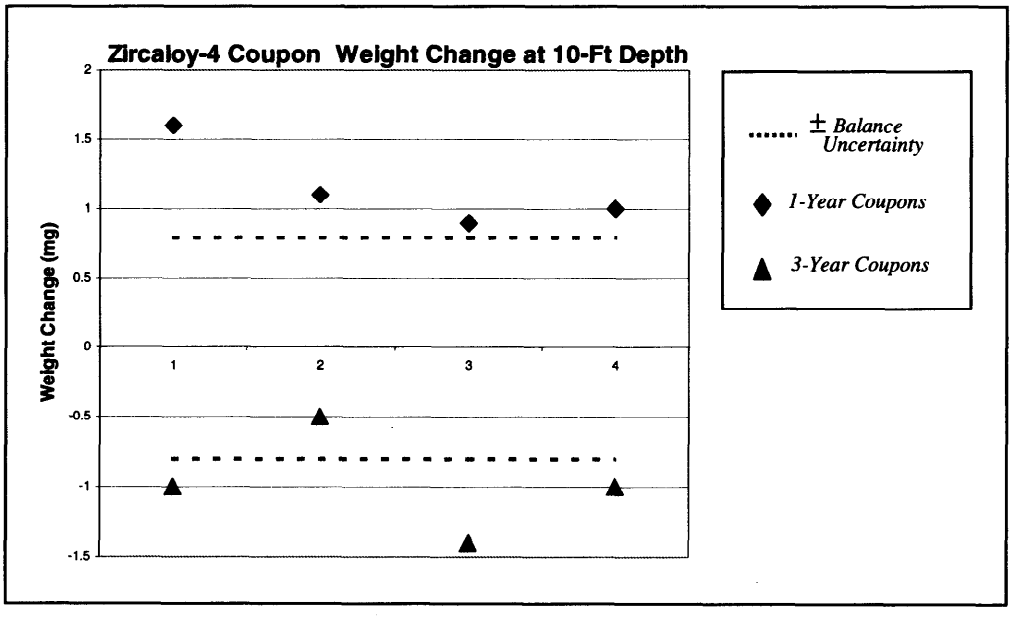

Figure 36. Zircaloy-4 weight change, 10-ft depth.